

WHAT IS CLAIMED IS:

1. An image processing apparatus comprising:

generation means for generating digital data which comprises a first data group required to maintain basic quality of the digital data, and a second data group required to maintain detailed quality;

change means for changing the second data group in the digital data; and

embedding means for embedding a digital watermark in the image which contains the changed second data group.

2. An image processing apparatus for embedding a digital watermark in an image, comprising:

setting means for setting a range of frequency components to be changed of frequency components of the image; and

change means for changing at least one of the frequency components included in the range of the frequency components to be changed,

wherein the digital watermark is embedded in the image which contains the frequency component changed by said change means.

3. The apparatus according to claim 2, further comprising:

frequency component calculation means for calculating frequency components of the image; and

image generation means for generating an image from frequency components of the image including the frequency component changed by said change means.

4. The apparatus according to claim 3, wherein said
5 frequency component calculation means includes at least one of wavelet transformation and discrete cosine transformation, and said image generation means includes at least one of inverse wavelet transformation and inverse discrete cosine transformation.

10 5. The apparatus according to claim 2, wherein a change process of said change means includes a bit-shift process.

6. An image processing apparatus for embedding a digital watermark in an image, comprising:

15 setting means for setting a range of bits to be changed of a plurality of bits which form a multi-valued pixel upon expressing pixels which form the image using multi-valued data; and

change means for changing at least one of bits
20 included in the range of bits to be changed,

wherein the digital watermark is embedded in the image which includes the bit changed by said change means.

7. The apparatus according to claim 2, wherein a
25 change process of said change means includes processes of four arithmetic operations.

8. The apparatus according to claim 6, wherein a change process of said change means includes processes of four arithmetic operations.

9. The apparatus according to claim 6, wherein a
5 change process of said change means includes bit inversion.

10. The apparatus according to claim 2, wherein said change means changes for respective users.

11. The apparatus according to claim 6, wherein said
10 change means changes for respective users.

12. An image processing method comprising:

the generation step of generating digital data which comprises a first data group required to maintain basic quality of the digital data, and a second data
15 group required to maintain detailed quality;

the change step of changing the second data group in the digital data; and

the embedding step of embedding a digital watermark in the image which contains the changed
20 second data group.

13. An image processing method for embedding a digital watermark in an image, comprising:

the setting step of setting a range of frequency components to be changed of frequency components of the
25 image; and

the change step of changing at least one of the frequency components included in the range of the frequency components to be changed,

wherein the digital watermark is embedded in the image which contains the frequency component changed in the change step.

14. The method according to claim 13, further comprising:

the frequency component calculation step of calculating frequency components of the image; and the image generation step of generating an image from frequency components of the image including the frequency component changed in the change step.

15. An image processing method for embedding a digital watermark in an image, comprising:

the setting step of setting a range of bits to be changed of a plurality of bits which form a multi-valued pixel upon expressing pixels which form the image using multi-valued data; and

the change step of changing at least one of bits included in the range of bits to be changed,

wherein the digital watermark is embedded in the image which includes the bit changed in the change step.

16. A storage medium that stores a program code which can be executed upon being loaded onto a computer, comprising:

a program code of the generation step of
generating digital data which comprises a first data
group required to maintain basic quality of the digital
data, and a second data group required to maintain
5 detailed quality;

a program code of the change step of changing the
second data group in the digital data; and

a program code of the embedding step of embedding
a digital watermark in the image which contains the
10 changed second data group.

17. A storage medium that stores a program code which
serves as an image processing apparatus for embedding a
digital watermark in an image, comprising:

a program code of the setting step of setting a
15 range of frequency components to be changed of
frequency components of the image; and

a program code of the change step of changing at
least one of the frequency components included in the
range of the frequency components to be changed,

20 wherein the digital watermark is embedded in the
image which contains the frequency component changed in
the change step.

18. The medium according to claim 17, further
comprising:

25 a program code of the frequency component
calculation step of calculating frequency components of
the image; and

a program code of the image generation step of generating an image from frequency components of the image including the frequency component changed in the change step.

- 5 19. A storage medium that stores a program code which serves as an image processing apparatus for embedding a digital watermark in an image, comprising:

a program code of the setting step of setting a range of bits to be changed of a plurality of bits

- 10 which form a multi-valued pixel upon expressing pixels which form the image using multi-valued data; and

a program code of the change step of changing at least one of bits included in the range of bits to be changed,

- 15 wherein the digital watermark is embedded in the image which includes the bit changed in the change step.

20. An image processing apparatus for embedding a digital watermark in an image, comprising:

- 20 generation means for segmenting pixels which form the image into blocks, and generating an average value image having average pixel values of pixels included in the blocks; and

change means for changing a value of at least one pixel of pixels included in each block,

- 25 wherein the digital watermark is embedded in an image including the pixel, the value of which is changed by said change means.

21. The apparatus according to claim 20, wherein a change process of said change means includes a process for changing pixel values to define a normal distribution from the average pixel value of pixels included in each block.

22. The apparatus according to claim 20, wherein a change process of said change means includes processes of four arithmetic operations.

23. An image processing method for embedding a digital watermark in an image, comprising:
the generation step of segmenting pixels which form the image into blocks, and generating an average value image having average pixel values of pixels included in the blocks; and
the change step of changing a value of at least one pixel of pixels included in each block,
wherein the digital watermark is embedded in an image including the pixel, the value of which is changed in the change step.

24. The method according to claim 23, wherein a change process in the change step includes a process for changing pixel values to define a normal distribution from the average pixel value of pixels included in each block.

25. The method according to claim 23, wherein a change process in the change step includes processes of four arithmetic operations.

26. A computer readable storage medium that stores a program code for implementing an image process for embedding a digital watermark in an image, comprising:

a program code of the generation step of
5 segmenting pixels which form the image into blocks, and
generating an average value image having average pixel
values of pixels included in the blocks; and

a program code of the change step of changing a
value of at least one pixel of pixels included in each
10 block,

wherein the digital watermark is embedded in an
image including the pixel, the value of which is
changed in the change step.

27. The medium according to claim 26, wherein a
15 change process in the change step includes a process
for changing pixel values to define a normal
distribution from the average pixel value of pixels
included in each block.

28. The medium according to claim 26, wherein a
20 change process in the change step includes processes of
four arithmetic operations.